

CLAIMS

1. A method of processing a sequence of image frames to estimate image velocity through the sequence comprising:

5 block matching using a similarity measure by comparing the intensities in image blocks in two frames of the sequence and calculating the similarity between the said blocks on the basis of their intensities, calculating from the similarity a probability measure that the two compared blocks are the same, and estimating the image velocity based on the probability measure, wherein the probability measure is
10 calculated using a parametric function of the similarity which is independent of position in the image frames.

2. A method according to claim 1 wherein the parameters of the parametric function are independent of position in the image frames.

15 3. A method according to claim 2 wherein at least one of the parameters is optimised by coregistering the frames in the sequence on the basis of the calculated image velocity, calculating a registration error and varying at least one of the parameters to minimise the registration error.

20 4. A method according to claim 3 wherein the registration error is calculated from the differences of the intensities in the coregistered frames.

5. A method according to claim 4 wherein the registration error is calculated from
25 the sum of the squares of the differences of the intensities in the coregistered frames.

6. A method according to any one of the preceding claims further comprising the step of normalising the calculated similarity with respect to the size of the block and calculating the probability measure on the basis of the normalised similarity.

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7. A method according to claim 6 wherein the calculated similarity is normalised by dividing it by the number of image samples in the block.
8. A method according to claim 6 wherein the calculated similarity is normalised by
5 dividing it by the number of pixels in the block.
9. A method according to any one of the preceding claims wherein the probability measure is a monotonic function of the similarity.
- 10 10. A method according to any one of the preceding claims wherein the probability measure is thresholded such that motions in the image velocity whose probabilities have a predefined relationship with a threshold are ignored.
11. A method according to claim 10 wherein the threshold is optimised by
15 coregistering the frames in the sequence on the basis of the calculated image velocity, calculating a registration error and varying the threshold to minimise the registration error.
12. A method according to claim 10 or 11 wherein the threshold is positionally
20 independent.
13. A method according to claim 10, 11 or 12 wherein the threshold and parameters are optimised together.
- 25 14. A method according to any one of the preceding claims further comprising normalising the intensities in the two blocks to have the same mean and standard deviation before calculating said similarity.
15. A method according to any one of the preceding claims wherein the similarity
30 measure is the CD_{2-bis} similarity measure.

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16. A method according to any one of the preceding claims wherein the block matching is conducted across three frames of the sequence by comparing the intensities in blocks in the first and third and the second and third of the three frames and calculating the similarity from said compared intensities.

17. A method according to claim 16 wherein the blocks in the first and second frames are blocks calculated as corresponding to each other on the basis of a previous image velocity estimate.

18. A method of processing a sequence of image frames to estimate image velocity through the sequence comprising:

block matching using a similarity measure by comparing the intensities in image blocks in three frames of the sequence by comparing the intensities in blocks in the first and third and the second and third of the three frames, and calculating the similarity between the said blocks on the basis of their intensities.

19. A method according to claim 18 wherein the blocks in the first and second frames are blocks calculated as corresponding to each other on the basis of a previous image velocity estimate.

20. A method according to claim 19 comprising defining for each block in the second frame a search window encompassing several blocks in the third frame, and calculating the similarity of each block in the search window to the said block in the second frame and to the corresponding position of the said block in the first frame based on the previous image velocity estimate.

21. A method of processing a sequence of image frames to estimate image velocity through the sequence comprising:

block matching using a similarity measure by comparing the intensities in

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image blocks in two frames of the sequence and calculating the similarity between the said blocks on the basis of their intensities, further comprising normalising the intensities in the two blocks to have the same mean and standard deviation before calculating said similarity.

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22. A method according to claim 21 wherein the similarity measure is the CD_{2-bis} similarity measure.

23. A method according to claim 21 or 22 wherein the block matching is conducted
10 across three frames of the sequence by comparing the intensities in blocks in the first and third and the second and third of the three frames and calculating the similarity from said compared intensities.

24. A method according to claim 23 wherein the blocks in the first and second
15 frames are blocks calculated as corresponding to each other on the basis of a previous image velocity estimate.

25. A method according to any one of the preceding claims wherein the image
velocity estimate is refined by modifying the image velocity estimate at each position
20 in the image with the estimated image velocity at surrounding positions.

26. A method according to any one of the preceding claims wherein the images are medical images.

25 27. A method according to any one of the preceding claims wherein the images are ultrasound images.

28. Image processing apparatus comprising an image velocity estimator adapted to
estimate image velocity in accordance with the method of any one of the preceding
30 claims.

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29. A computer program comprising program code means for executing on a programmed computer the method of any one of claims 1 to 27.

30. A computer-readable storage medium storing a computer program according to
5 claim 29.